HUGHES
SERVICE INFORMATION
LETTER

LETTER NO. L-23
DATE June 16, 1967

TO—All owners and operators of Hughes Helicopters

SUBJECT: APPROVED FUELS FOR ALLISON MODEL 250 SERIES ENGINE

MODELS AFFECTED: All 500 Model 369H Helicopters

Reference

Allison Division, General Motors Corporation
Model 250-C18/C18A Specification No. C731-B

In addition to MIL-T-5624 Grade JP-4 fuel, the FAA has approved unrestricted use of Grade JP-5 fuel in the Model 250 series engine. Fuels conforming to ASTM 1655-64T, Type A or A1 (Commercial Kerosene) and MIL-F-46005 are also approved without restriction. Authorized emergency fuel remains unchanged, i.e. aviation gasoline MIL-G-5572 is approved for a maximum of six (6) hours of operation during one overhaul period for emergency use only.

Fuel Specification

Primary	MIL-J-5624 Grade JP-4 or ASTM D1655 Jet B MIL-F-5624 Grade JP-5 or ASTM D1655 Jet A or A1 MIL-F-46005A Type I
Emergency	(6 hours maximum) aviation gasoline MIL-G-5572 All grades in overhaul period)

CAUTION

MIL-G-5572 Fuel containing Tri-cresyl-phosphate additives shall not be used.

STORAGE AND HANDLING OF JET FUELS

General - Due to the sensitivity of jet aircraft engines and fuel systems to microscopic quantities of water, dirt, solid materials and other contaminants, the utmost care should be exercised in the storage and handling of jet fuels. Certain procedures and precautions should be observed when handling flammable jet fuels to insure delivery of uncontaminated fuels to the aircraft with a minimum of hazard to personnel or equipment.

This bulletin emphasizes recommended practices for the safe handling and storage of the following jet fuels approved for use in all Hughes Model 369H Helicopters:

Jet A (JP-5) - A high flash point distillate of the kerosene type with a $-40^{O}F$ freezing point.

Jet A-1 (JP-5) - A kerosene type fuel similar to Jet A but having special low temperature characteristics with a freezing point of $-58^{O}F$.

Jet B (JP-4) - A relatively wide boiling range volatile distillate having a $-60^{O}F$ freezing point.

Handling - Jet Fuel - The following principles are recommended for jet fuel handling and small tank or drum storage facilities.

Product Cleanliness - Every effort should be made to obtain maximum quality and cleanliness of fuel. If possible, the use of compact filters-separators or monitors between skid mounted tanks or drums and the aircraft is recommended. The drum, pump, nozzle, filter, and aircraft should be electrically bonded for filtering and fueling operations.

Settling - It takes about five times as long or longer to settle particles of rust, dirt or other solids out of jet fuel as is required to settle out of aviation gasoline. Contact with free water should be avoided. If water or solid particles have contaminated fuel, it is necessary to provide adequate settling time to separate dirt and water from the fuel. This applies particularly when handling and storing jet fuel in small drums.

Sampling & Testing - Before fueling the aircraft, drums should be tested for water by the use of litmus paper or water - detecting paste. Any water found in the drums should be removed. A sample of fuel should also be drawn into a clean, dry, round, clear glass bottle and checked visually for clearness (no sediment or emulsion) and brightness (no cloud or haze). Visible water can be distinguished by cloudiness, droplets, emulsion, or a separate layer. Swirl the bottle to create a vortex in the liquid. Any contaminants present will collect beneath the vortex. Fuel which does not pass these tests should not be delivered to the aircraft.

Fueling Practices - For a flammable liquid to burn, it must first be vaporized, mixed with air in the proper proportions and the mixture raised to its ignition temperature. The fuel vapor-air mixture above the surface of Jet B in storage is nearly always in the explosive range, therefore, extreme care must be taken to prevent ignition of this mixture by static electricity or other sources. Equally combustible mixtures can also be produced by mixing gasoline or Jet B with Jet A fuels. Always fuel and defuel in open air, never inside a hanger. Always wait until the engine has stopped and all electrical equipment is shut down.

When handling jet fuels, the following precautions should be observed to minimize static electricity:

a. Do not use splash filling.
b. Do not agitate with air, steam, gas or mechanical mixers.
c. Avoid introduction of outside air with product being pumped into fuel tank.
d. Always ground aircraft and fueler before fuel tank cap is removed.
e. Maintain ground throughout the fueling operation.
f. Fuel handlers should not carry matches, lighters or spark-producing devices during fueling operations.

Drum Storage - Fuel drums should be kept sealed and stored on their sides. If drums are stored upright, the expansion and contracting of the fuel and air within the drum due to temperature changes will draw in water which may be standing on the drum heads.

FIRE PREVENTION

Fuel Spillage - In case of jet fuel spills, the first safety precaution is to prevent all smoking, open flames or ignition from engines, motors, electrical outlets or switches in the immediate area. Also, keep moving cars and trucks at a safe distance from the spill area. A leak in a fuel hose can emit a highly explosive mist, with combustion proceeding at a rapid rate. Constant inspection and maintenance of fuel hose lines is recommended.

Removal of small fuel spills (5 to 10 gal.) can be accomplished by using commercial drying absorbent materials. Material absorbed with fuel should then be burned or disposed of in a safe area. Bigger spills may be disposed of by blanketing with foam when possible, then washing area with copious quantities of water. Fuel should not be washed into public sanitary or storm sewer systems.

Clothing on which fuel has been spilled should be changed at once because of the fire hazard. Skin should be washed immediately with soap and water to prevent skin irritation and blisters.

Electrical Storms - Fueling operations should not be conducted during severe lightening and electrical storms.

Fire Fighting - Fire fighting and explosion prevention methods used by the industry for other petroleum products will also apply to jet fuels. "No Smoking" restrictions should be strictly enforced wherever jet fuel is handled. Fire extinguishers should be immediately available, preferably upwind of aircraft being serviced.

Grounding - Always ground aircraft and fueler before fuel tank cap is removed, and maintain ground throughout fueling operations. Grounding will avoid problems which may arise from stray currents or deficiencies in the aircraft or fueler electrical system.

NOTE

Additional information on jet fuel handling and storage may be obtained by writing for API Bulletin 1503, December 1965, Fifth Edition, "The Storage and Handling of Jet Fuels at Airports" and API Bulletin 1501, November 1965, Fourth Edition, "The Filtration of and Water Removal from Aviation Fuels" - issued by Aviation Technical Service Committee, Division of Marketing, American Petroleum Institute, 1271 Avenue of the Americas, New York, New York. Also "Aircraft Fueling Up to Date" prepared by the Flight Safety Foundation, 468 Park Ave. South, New York, New York.